

Proposed

AMENDMENTS TO THE CLAIMS:

1. (Currently Amended) A method of determining the oil fraction of a fluid emulsion comprising heavy oil/bitumen and water by direct measurement comprising the steps of:
 - (a) providing a low field NMR relaxometer;
 - (b) measuring and recording the T_2 relaxation spectrum of the emulsion at a temperature allowing recovery of the T_2 spectrum of the heavy oil/bitumen, substantially separate from a T_2 water peak;
 - (c) determining a distinguishing T_2 cutoff value;
 - (d) measuring the total amplitude (A_{oil}) of the spectrum at T_2 times less than and equal to the T_2 cutoff value ($A_{oil\leq}$); and
 - (e) converting A_{oil} to a weight value by dividing A_{oil} by the amplitude index of an oil standard (AI_{oil}) of known weight ($AI_{oil\leq}$); and
 - (f) using the weight value to determine the oil fraction of the fluid emulsion.
2. (Original) The method of claim 1 wherein the temperature is about 30°C and the T_2 cutoff value is about 10 milliseconds.
3. (Currently Amended) A method of determining the water fraction of a fluid emulsion comprising heavy oil/bitumen and water by direct measurement comprising the steps of:
 - (a) providing a low field NMR relaxometer;
 - (b) measuring and recording the T_2 relaxation spectrum of the emulsion;
 - (c) determining a distinguishing T_2 cutoff value;
 - (d) measuring the total amplitude (A_w) of the spectrum at T_2 times greater than the T_2 cutoff value ($A_{w\geq}$); and

- (e) converting A_w to a weight value by dividing A_w by the amplitude index of a water standard (AI_w) of known weight (AL_w); and
- (f) using the weight value to determine the water fraction.
4. (Previously Amended) The method of claim 3 further comprising the steps of determining the total weight of the sample and determining the oil fraction of the emulsion by subtracting the water fraction of the sample from the total weight of the sample.
5. (Currently Amended) An apparatus ~~for~~ determining by direct measurement the oil fraction of a flowing fluid emulsion comprising heavy oil/bitumen and water comprising:
- (a) a low field NMR relaxometer having a NMR magnet positioned in proximity to a channel through which the emulsion flows, said relaxometer for measuring the T_2 spectrum of a ~~the~~ sample at a temperature allowing recovery of the T_2 spectrum of the heavy oil/bitumen, substantially separate from a T_2 water peak;
- (b) means for identifying a distinguishing T_2 cutoff value;
- (c) means connected to the relaxometer for measuring total T_2 amplitude below a T_2 cutoff value value, wherein a substantial portion of the spectrum attributable to the oil is at T_2 values less than or equal to the T_2 cutoff value; and
- (d) means for converting the total T_2 amplitude value to a weight value; and
- (e) means for determining the weight value to determine the oil fraction of the fluid emulsion.
6. (Original) The apparatus of claim 5 wherein the T_2 cutoff value value is about 10 milliseconds.

7. (Original) The apparatus of claim 5 wherein the relaxometer operates at less than about 2 MHz.

8. (Original) The apparatus of claim 7 wherein the relaxometer operates at about 1 MHz.

9. (Original) The apparatus of claim 5 further comprising a heater for heating the emulsion flow.

10. (Currently Amended) An apparatus for determining by direct measurement the oil fraction of a fluid emulsion comprising heavy oil/bitumen and water comprising:

- (a) means for obtaining a sample of the emulsion;
- (b) a low field NMR relaxometer for measuring the T_2 spectrum of the sample at a temperature allowing recovery of the T_2 spectrum of the heavy oil/bitumen, substantially separate from a T_2 water peak;
- (c) means for identifying a distinguishing T_2 cutoff value;
- (d) means connected to the NMR relaxometer for measuring total T_2 amplitude below a the T_2 cutoff value, wherein a substantial portion of the spectrum attributable to the oil is at T_2 values less than or equal to the T_2 cutoff value;
- (e) means for converting the total T_2 amplitude value to a weight value; and
- (f) means for determining the weight value to determine the oil fraction of the fluid emulsion.

11. (Currently Amended) A method of determining by direct measurement the oil fraction and water fraction of a fluid emulsion comprising heavy oil/bitumen and water comprising the steps of:

- (a) providing a low field NMR relaxometer;

- (b) measuring and recording the T_2 relaxation spectrum of the emulsion at a temperature allowing recovery of the T_2 spectrum of the heavy oil/bitumen substantially separate from a T_2 water peak;
- (c) determining a distinguishing T_2 cutoff value;
- (d) measuring the total amplitude (A_{oil}) of the spectrum at T_2 times less than and equal to the T_2 cutoff value; (A_{oil});
- (e) converting A_{oil} to a weight value by dividing A_{oil} by the amplitude index of an oil standard (AI_{oil}) of known weight (AI_{oil});
- (f) measuring the total amplitude (A_w) of the spectrum at T_2 times greater than the T_2 cutoff value (A_w); and
- (g) converting A_w to a weight value by dividing A_w by the amplitude index of a water standard (AI_w) of known weight (AI_w); and
- (h) using the oil weight value and the water weight value to determine the oil fraction and water fraction respectively.

B E N N E T T J O N E S

FAX MESSAGE

Examiner Tiffany Fetzner
U.S. Patent and Trademark Office

Bennett Jones LLP
1000 ATCO Centre
10035 - 105 Street
Edmonton Alberta
T5J 3T2

Tel 780.917.5231
Fax 780.421.7951

FAX No. 571-273-2241

PHONE No.

DATE April 29, 2004

This is the first page of 4

If all pages not received, call 780.421.8133 for assistance.

FROM Edward (Ted) Yoo

LAWYER No 807 FILE No 45074.32

Original Status - Retained on File

This facsimile was successfully transmitted at:

MESSAGE

Application No.: 09/852,339
Filing Date: May 11, 2001
Inventor (first named): Mirotchnik
Group Art Unit: 2859
Examiner Name: FETZNER, Tiffany A.
Attorney Docket No.: 45074.32

Dear Examiner Fetzner,
Further to our telephone conversation of this morning, I enclose proposed amendments to the claims in accordance with our discussions.

I appreciate your careful examination of this case.

Edward Yoo
Edward Yoo 41435

THIS MESSAGE IS INTENDED ONLY FOR THE USE OF THE ADDRESSEE AND MAY CONTAIN INFORMATION THAT IS PRIVILEGED AND CONFIDENTIAL. IF YOU ARE NOT THE INTENDED RECIPIENT, OR THE EMPLOYEE RESPONSIBLE FOR DELIVERING THE MESSAGE TO THE INTENDED RECIPIENT, YOU ARE HEREBY NOTIFIED THAT ANY DISSEMINATION OF THIS COMMUNICATION IS STRICTLY PROHIBITED. IF YOU HAVE RECEIVED THIS COMMUNICATION IN ERROR, PLEASE NOTIFY US IMMEDIATELY BY TELEPHONE. THANK YOU.

CALGARY • EDMONTON • TORONTO